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Testimony submitted to the Committee on Government Reform Hearing, June 28, 2005

"To Lead or Follow: The Next Generation Internet and The Transition to IPv6"

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Mr. Chairman, honored members of this committee:

Thank you for allowing me to share my observations on the possibilities, opportunities and challenges presented to the US federal government by the looming and inevitable transition to Internet Protocol version 6, IPv6, which is also referred to as The New Internet.

As the name of this hearing, "To Lead or Follow," implies, this is an urgent time for LEADERSHIP. The federal government invested the first $50 million in the first Internet, and as a result the U.S. led the world in that technology. The U.S. has 50% of the Internet service business, and the Internet has impacted thousands of industries, creating an estimated $500 billion a year in extra federal revenues, and adding over $1 trillion in wealth via companies like Google, Yahoo!, Amazon, eBay, and hundreds of others.

Similarly, the New Internet has the potential to create 10 million new American jobs and trillions of dollars in revenue for the U.S., but leadership is slipping away to other countries, and it will soon be difficult, if not impossible, to recover. One company, Japan's NTT, has more IPv6 customers than all American companies combined.

Japan, China, Korea, and Europe have invested over $800 million in the New Internet, and are now changing the New Internet to reflect their political priorities, which are very, very different from America's political priorities, and even American laws.

With federal leadership in the New Internet, the U.S. federal government will create a service export boom, with millions of innovative new jobs, increased competitiveness for hundreds of industries, and thousands of new startups, potentially creating a booming economy.

American leadership in the New Internet will also add thousands of new products vital to our military and homeland defense, better security, and underpin sustainable technological leadership for the United States. The promise of the products and services enabled by the New Internet is huge -- an affordable way to show high quality television over the Internet, a possible way to deal with spam and attacks on networks, and hundreds of applications to make American lives easier and safer.

Over $9 trillion of America's nearly $13 trillion economy relates to services, subscriptions, and transactions, and IPv6 will help keep the trust and keep hundreds of millions of customers loyal to American companies.

If we **don't** show leadership in the New Internet, we get a loss of millions of jobs and market share across thousands of companies.

A loss of public trust and reputations in transactions over U.S. networks using the existing, highly vulnerable IPv4 protocol, coupled with an increase in trust of IPv6 networks in Japan, Korea, China, and the 25 nations of Europe, could have a devastating impact on America's service economy. Internet Service Providers, telecommunications giants, and banks, brokers and even our defense contractors will lose business.

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Where the U.S. government showed leadership, as we did with the post office, the interstate highway system, airplanes, lasers, radar, computer chips, and satellites, we are world leaders even decades later.

Where our government did **not** show leadership, including color televisions, big screens and high definition television, digital cameras, and DVDs, America plays almost no role in these and related areas, except as a consumer. We are a follower, not a leader, in these fields. If we do not show leadership in the New Internet, this same thing will happen to us, but on a much broader basis -- it will be in everything the New Internet touches, which is almost everything.

Mr. Chairman, the opportunity exists for the American government to show leadership in the New Internet, to make a real difference for our national security and our industries and workers. By supporting the transition of the government agencies to the New Internet standard, as the Defense Department has already started to do, we will not only support a more efficient and effective government -- that is, help facilitate fundamental government reform -- but will send a signal to the world that America is still a technology leader in the 21st century, and for anything as important as a New Internet standard, it will not be left behind, but will march in front, and our Coalition Partner governments will join with us and rally to our standards banner.

Mr. Chairman, there are many specific actions that your Committee could take to support the promotion of the New Internet in our government, and to support the government reform that will be possible when all of government talks with the same technical language, so to speak, with this new standard. Here are three.

1. Mandate IPv6 for the entire federal government by 2010.

2. Choose a leader who has the authority, responsibility, and accountability as well as the creativity, passion, and integrity, to galvanize thousands of other leaders to get excited and committed to making the transition to IPv6 on schedule.

3. Enable this leader to create a Federal IPv6 Transition Office (FITO) to serve as the central engine for the federal IPv6 transition, overseeing a budget to be determined, and with a budget for FITO itself of perhaps $50 million. This office will assist in managing the complexity of an Internet transition, something we did before, in the early eighties when the Internet was only one-millionth as large as it is today.

If I had to summarize what the federal government should know about IPv6 it would be: The transition to IPv6 has costs and benefits. The benefits far outweigh the costs. Failure to transition to IPv6 by 2012 will cause a loss of federal revenues that is roughly comparable to a tax cut, with these funds flowing to Europe and Asia rather than to American taxpayers.

Thank you, Mr. Chairman and members of this Committee, for your time and attention, and for the proud leadership role in technology and innovation for America that you represent.

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APPENDIX

I think there are ten points that could serve to justify this Committee's interest in and support of federal leadership in IPv6.

1. IPv6 has advantages for security, including authentication, mandatory IPSec (Internet Protocol Security), and Quality of Service that can, combined with intelligent policy choices, reduce a number of low-level outside attacks and may potentially help to fight spam and other parasitic uses of the Internet. IPv6 also has advantages for mobility and ad hoc networking, larger packet sizes, and a vastly larger number of addresses. Autoconfiguration also makes IPv6 easier to get started using and faster by making human configuration unnecessary. It's useful to remember that these advantages can touch the lives of 295 million Americans and their 13 million companies and 100 million homes, creating massive potential multiplier effects of these benefits.

2. The transition to IPv6 globally is inevitable, but American participation in the benefits is not. In the foreseeable future, more products will be shipped with IPv6 connections (TVs, cars, radios, PCs with MS Longhorn OS, mobile phones, toys, home appliances, cash registers, etc.) than is the case for the one billion IPv4 users today. IPv4 was made to connect mainframes and minicomputers. IPv6 was made to connect almost everything electronic, a category millions of times larger. In 1965 there were 10,000 people for every computer. By 2015 there may be 10,000 connected IT devices for every person.

3. As many as 250 different objects or systems in the average home could potentially be connected to the Internet. It's possible that Americans will be swimming in IPv6 addresses that come with their consumer electronics, white goods, electrical outlets, tools, thermostats, etc. The federal government will need to be involved at multiple levels to insure safety, interoperability between different industries, and more.

4. The federal government will need to keep tabs on the automated economy further enabled by IPv6, which could have tax, labor, legal, intelligence, and other ramifications. Machine-to-Machine Internet communications will grow at least ten times as fast as human-to-human Internet communications in the future. There is an "Internet Iceberg Effect," in that over 90% of the growth of Internet communications will not be directly observed by humans

5. IPv6 is essential to the continued expansion of wireline broadband, wireless telephony, wireless broadband, RFID, supply chain management, commercial nanotechnology, medical monitoring, digital intellectual property rights management, information sharing, and synchronization, and trade, in digital services, subscriptions and transactions

6. The rewards to early adopters of a new Internet protocol are disproportionately greater than to the later adopters. The American federal government spent $50 million on the early Internet, and receives over $500 billion in extra federal revenue as a consequence, a million-fold return every year. The U.S. federal government outspent all other federal governments combined -- by 100 to 1 -- during the early IPv4 Internet. As a consequence, the U.S. has half of the ISPs and half of the IPv4 traffic. Other governments, primarily Japan, Korea, China, and the European Union, have outspent the U.S. federal government 100 to 1 ($800 million to $8 million) in this decade. As a consequence, foreign countries currently have over 80% of IPv6 traffic -- and could potentially have 99% of IPv6 traffic by 2008 -- if they enforce their mandates and build v6 networks as planned.

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7. To lead or follow? The difference between U.S. leadership in IPv6 versus U.S. lack of leadership could be an extra $1 trillion in annual GDP and 10 million jobs in fast growing sectors, including home-based health care, security monitoring, transaction processing for banks, brokers, and insurance companies. The U.S. is a net importer in the amount of $600 to $700 billion annually of goods, as well food, capital, people, and labor. The U.S. is a net exporter, based on leadership in IT, of media, services, data, and transactions. Loss of Internet leadership could lead to being a net importer in every category.

8. The transition to IPv6 has five phases, and we are in the middle of Phase 2, acceptance. The first four phases have to do with IPv6 existence, acceptance, equivalence, and dominance. The fifth phase is IPv4 extinction, as trusted networks cease to route IPv4 packets unless they are encapsulated in IPv6 packets between trusted senders. The last time we had a similar transition co-existence, the U.S. federal government terminated all use of the old Internet Protocol (NCP) ten years after the introduction of the new Internet protocol. We are seven years into the new Internet protocol this time. The federal government needs to estimate the optimal date to make a complete switch to IPv6 and to turn off IPv4 packets as it did with NCP. The benefits of running dual protocols when IPv6 is widespread will not outweigh the costs.

9. The Chinese government deserves more attention and respect than it has received for its spectacular achievements related to information technology. China is #1 in total wireless users and #2 in broadband (after the US), and is likely to pass Japan as #1 in IPv6 users within two years, and never look back. China is engaging in Internet diplomacy by agreeing to face to face meetings with ministers of communications from Korea and Japan every six months. China could gain support from dozens of nations if it used its full diplomatic and commercial power to gather support for its own version of IPv6, starting with its own version of IPSec, since the U.S. prohibits exports of IPSec software not only from the US but also its Coalition Partners.

10. The European Union has a number of laws that require anonymity, and it is possible that, in the absence of consistent, firm, and serious U.S. leadership, Europe will make another version of IPv6, one that will reduce security by making each user virtually untraceable. The U.S. cannot assume that Europe, or any other country or group of countries, will use their leadership and investment in IPv6 the way the U.S. would.

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